

414 Rec'd PCT/PTO 22 SEP 2000

FORM PTO-1390 REV. 5-93		US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEYS DOCKET NUMBER P00,1177
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/646812
INTERNATIONAL APPLICATION NO. PCT/DE99/00734	INTERNATIONAL FILING DATE 16 MARCH 1999	PRIORITY DATE CLAIMED 24 MARCH 1998	
TITLE OF INVENTION "METHOD AND RADIO COMMUNICATIONS SYSTEM FOR CONTROLLING CONNECTIONS FOR CALLS TO AND BY RADIO SUBSCRIBERS"			
APPLICANT(S) FOR DO/EO/US KOEN MUYSEWINKEL, ET AL.			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.</p> <p>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</p> <p>5. <input checked="" type="checkbox"/> A copy of International Application as filed (35 U.S.C. 371(c)(2)) - drawings attached.</p> <p>a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> has been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US)</p> <p>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)) - drawings attached.</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))</p> <p>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> have been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input checked="" type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)) change of address of applicants' representative attached</p> <p>10. <input checked="" type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11. to 16. below concern other document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; (PTO 1449, Prior Art, Search Report).</p> <p>12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. (SEE ATTACHED ENVELOPE)</p> <p>13. <input checked="" type="checkbox"/> Amendment "A" Prior to Action.</p> <p><input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>14. <input type="checkbox"/> A substitute specification.</p> <p>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>16. <input checked="" type="checkbox"/> Other items or information:</p> <p>a. <input checked="" type="checkbox"/> Request for Approval of Drawing Modifications, 3 sheets of drawings, Figures 1-3.</p> <p>b. <input checked="" type="checkbox"/> Abstract Replacement Page, Page 17.</p> <p>c. <input checked="" type="checkbox"/> EXPRESS MAIL # EJ220499435US dated September 22, 2000.</p>			

U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.5)

09/646812

INTERNATIONAL APPLICATION NO.
PCT/DE99/00734ATTORNEY'S DOCKET NUMBER
P00,117717. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5):**

Search Report has been prepared by the EPO or JPO \$840.00

International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) .. \$670.00

No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but
international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) \$760.00Neither international preliminary examination fee (37 C.F.R. 1.482) nor international
search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO \$970.00International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all
claims satisfied provisions of PCT Article 33(2)-(4) \$ 96.00**ENTER APPROPRIATE BASIC FEE AMOUNT =**

CALCULATIONS

PTO USE ONLY

\$ 840.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months
from the earliest claimed priority date (37 C.F.R. 1.492(e)).

\$

Claims

Number Filed

Number
Extra

Rate

Total Claims

14 - 20 =

0

X \$ 18.00

\$

Independent Claims

02 - 3 =

0

X \$ 78.00

\$

Multiple Dependent Claims

\$260.00 +

\$

TOTAL OF ABOVE CALCULATIONS =

\$ 840.00

Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also
be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)

\$

SUBTOTAL =

\$ 840.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months
from the earliest claimed priority date (37 CFR 1.492(f)).

\$

TOTAL NATIONAL FEE =

\$ 840.00

Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be
accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). \$40.00 per property

+

TOTAL FEES ENCLOSED =

\$ 840.00

Amount to be
refunded

\$

charged

\$

- a. ☒ A check in the amount of \$ 840.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. 08-2290. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be
filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

SCHIFF HARDIN & WAITE
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SIGNATURE

Mark Bergner

NAME

45,877

Registration Number

430 Rec'd PCT/PTO 22 SEP 2000

-1-

BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

5	APPLICANT(S):	KOEN MUYSEWINKEL, ET AL.
	ATTORNEY DOCKET NO.:	P00,1177
	INTERNATIONAL APPLICATION NO:	PCT/DE99/00734
	INTERNATIONAL FILING DATE:	16 MARCH 1999
	INVENTION:	“METHOD AND RADIO COMMUNICATIONS SYSTEM FOR CONTROLLING CONNECTIONS FOR CALLS TO AND BY RADIO SUBSCRIBERS”

10 Assistant Commissioner for Patents,
Washington D.C. 20231

AMENDMENT “A” PRIOR TO ACTION

Sir:

Applicants herewith amend the above-referenced PCT application, and
 15 request entry of the Amendment prior to examination on the United States
 Examination Phase.

IN THE SPECIFICATION:

In the original application, at the top of page 1, delete “GR 98 P 1418 P”.

20 In the original application, at the top of pages 2-17, delete
“GR 98 P 1418”.

At the top of amended pages 2, 2a, and 15, delete "GR 98 P 1418 P"; and delete "PCT/DE99/00734".

At the top of amended page 13, delete “GR 98 P 1418 P”;
25 “PCT/DE99/00934”; and “New Patent Claims”.

On page 1:

cancel lines 1-5 and substitute

--SPECIFICATION

TITLE

5 "METHOD AND RADIO COMMUNICATIONS SYSTEM FOR
CONTROLLING CONNECTIONS FOR CALLS TO AND BY RADIO
SUBSCRIBERS"

BACKGROUND OF THE INVENTION

Field of the Invention-- therefor;

10 above line 10, insert

--Description of the Related Art--;

in line 18, cancel ",", and substitute --(-- therefor;

in line 19, cancel ",", and substitute --)-- therefor;

in line 20, after "subscribers", insert --,--; and

15 in line 21, cancel "-“ and substitute --,-- therefor, and after the last
“connections”, insert --,--.

On amended page 2:

above line 28, insert --SUMMARY OF THE INVENTION--; and

20 cancel lines 32-37 and substitute

-- This object is achieved by a method for connection control in a radio
communications system during calls from and to radio subscribers, the radio
communication system comprising a radio subsystem via which communications
terminals which allow access by the radio subscribers can be connected in an
25 associated radio area, and a switching center for switching through connections,
comprising the steps of routing the connections between the radio subsystem and
the switching center via a radio transmission unit, the step of routing comprising
switching through, for a case of a call within a radio area between radio
subscribers within a same the radio area, or for a case of a call between radio
30 subscribers in different radio areas, only signaling connections from the radio

transmission unit to the switching center, and switching traffic channel
connections by the radio transmission unit between a first radio subsystem and a
second radio subsystem for a case of a call within a radio area from the radio
subsystem itself, or for a case of a call between radio subscribers in different radio
5 areas.

The object of the invention is also achieved by a radio communications
system for connection control during calls from and to radio subscribers,
comprising communication terminals; a radio subsystem via which the
communications terminals which allow access by the radio subscribers can be
10 connected in an associated radio area; a switching center for switching through
connections; a radio transmission unit which is arranged between the radio
subsystem and the switching center and via which the connections are routed, the
routing being implemented so that when a call within a radio area between radio
subscribers within a same radio area, or when a call between radio subscribers in
15 different radio areas are made, only signaling connections are switched through
from the radio transmission unit to the switching center, and the routing being
implemented so that traffic channel connections are switched by the radio
transmission unit between a first radio subsystem and a second radio subsystem
when a call is made within a radio area from the first radio subsystem or when a
20 call is made between radio subscribers in different radio areas.-- therefor.

On page 4:

in line 9, after "example", insert --,--;

in line 30, before "on", insert --and--, and cancel "which" and substitute -
-this-- therefor; and

25 in line 31, after "identifier", insert --,--.

On page 5:

in line 15, cancel "that for";

above line 20, insert --BRIEF DESCRIPTION OF THE DRAWINGS --;

5 above line 33, insert --DESCRIPTION OF THE PREFERRED
EMBODIMENTS--.

10

in line 11, after “example”, insert --,--;

in line 17, after “say”, insert --,--; and

in line 38, after “example”, insert --,--.

15

in line 31, cancel “setting” and substitute --set-- therefor.

20

in line 16, cancel “-“; and

in line 29, cancel “bypassing” and substitute --i.e., bypassing the switching center-- therefor.

in line 7, after “example”, insert --,--; and

in line 31, cancel “using” and substitute --via-- therefor.

On page 10, in line 15, cancel “- see the arrows printed in bold” and substitute --(see the bold arrows)-- therefor.

On page 11:

in line 2, cancel “[lacuna]” and substitute --to-- therefor;

5 in lines 16-17, cancel “- see the arrows printed in bold” and substitute --
(see the bold arrows)-- therefor; and
in line 23, after “element”, insert --,--.

On page 12, below line 13, insert

-- The above-described method and communication system are illustrative
10 of the principles of the present invention. Numerous modifications and adaptations
thereof will be readily apparent to those skilled in this art without departing from
the spirit and scope of the present invention.--.

IN THE CLAIMS:

At the top of amended page 13, delete “GR 98 P 1418 P”;
15 “PCT/DE99/00934” and “New Patent Claims”.

On amended page 13, replace “Patent Claims” with WHAT IS
CLAIMED IS:

On amended page 15, delete “GR 98 P 1418 P” and
“PCT/DE99/00734”.

20 **Please amend claims 1-14 as follows:**

1. (Amended) A method for connection control in a radio communications
system [(KN)] during calls from and [/] to radio subscribers, said radio
communication system comprising a [having - at least one] radio subsystem
[(RSS, RSS*)] via which communications terminals [(MS)] which allow access
25 by said [the] radio subscribers can be connected in an associated radio area
[(RRA, RRA*)], and a [- at least one] switching center [(MSC)] for switching

through connections, comprising the steps of:

[characterized]

routing said [- in that the] connections between said [the] radio subsystem [(RSS)] and said [the] switching center [(MSC)] are routed] via a radio transmission unit [(UE)] in such a way], said step of routing comprising:

switching through, for a [- that, in the] case of a call within a radio area between radio subscribers within a [the] same said radio area [(RRA)], or for a [in the] case of a call between radio subscribers in different radio areas [(RRA, RRA*)], only signaling connections [(si)] are switched through] from said [the] radio transmission unit [(UE)] to said [the] switching center [(MSC)], and

switching [- that] traffic channel connections [(ni)] are switched] by said [the] radio transmission unit [(UE)] between a first radio subsystem [(RSS)] and a second radio subsystem [(RSS*)] in the] for a case of a call within a radio area from said [the] radio subsystem [(RSS)] itself, or for a [in the] case of a call between radio subscribers in different radio areas [(RRA, RRA*)].

2. (Amended) The method as claimed in claim 1, further comprising the step of: [in which]

switching through only said signaling connections for a [in the] case of a call which relates to a radio subscriber and a subscriber of another communications system [(PSTN)], only the signaling connections (si) are switched through] from said [the] radio transmission unit [(UE)] to said [the] switching center [(MSC)], and switching said [the] traffic channel connections [(ni)] between said [the] radio communications system [(KN)] and said [the] other communications system [(PSTN)] are switched] by said [the] radio transmission unit [(UE)].

3. (Amended) The method as claimed in claim 1, further comprising the step of: [or 2, in which]

sending back control information [(intra, inter) is sent back] from said [the] switching center [(MSC)] via a switched-through signaling connection [(si)],
5 said radio subsystem or said radio transmission unit initiating said switching of traffic channel connections utilizing said [on the basis of which] control information [(intra, inter) the radio subsystem (RSS) and/or the radio transmission unit (UE) cause/causes the switching of the traffic channel connections (ni)].

4. (Amended) The method as claimed in claim 3, further comprising the step of: [in which]

sending an identifier [(cic)] to identify trunks which are in each case used for a [the] call in said [the] switching center [(MSC) are also sent] back from said [the] switching center [(MSC)] via a switched-through signaling connection [(si), on the basis of which identifier (cic) the], said radio subsystem [(RSS) checks]
15 checking, utilizing said identifier, for a [the] presence of a call within a radio area, and causing said [causes the] switching of said [the] traffic channel connections [(ni)].

5. (Amended) The method as claimed in claim 1, further comprising the step of transmitting [one of the preceding claims, in which] voice signals [are transmitted] on said [the] traffic channel connections [(ni)].
20

6. (Amended) The method as claimed in claim 1, wherein [one of the preceding claims, in which] a satellite [(SAT)] is used as said [the] radio transmission unit [(UE)].

7. (Amended) The method as claimed in claim 1, further comprising the step of: [one of the preceding claims, in which]
25 carrying out a transcoder and data rate adaptation function;

[the] switching said [of the] signaling connections [(si)] and said [of the] traffic channel connections [(ni)] for an [the] uplink transmission direction from said [the] communications terminal [(MS)] to said [the] radio subsystem [(RSS) takes] taking place after said step of carrying out a transcoder and data rate adaptation function, and

switching said signaling connections and said traffic channel connection [that] for a [the] downlink transmission direction from said [the] radio subsystem [(RSS)] to said [the] communications terminal [(MS) takes] taking place before said step of carrying out the transcoder and data rate adaptation function in a [the] respective said radio subsystem [(RSS)].

8. (Amended) The method as claimed in claim 1, further comprising the step of: [one of the preceding claims, in which]

controlling said [the] switching of said [the] signaling connections [(si)] and of said [the] traffic channel connections [(ni)] in said [the] respective radio subsystem [(RSS, RSS*) is controlled] by an interworking unit [(IWU, IWU*)] with a through-switching capability.

9. (Amended) The method as claimed claim 1, further comprising the step of: [in one of the preceding claims, in which]

controlling said [the] switching of said [the] signaling connections [(si)] to said [the] switching center [(MSC) is controlled] by an interworking unit [(IWU)] with a through-switching capability.

10. (Amended) A radio communications system [(KN)] for connection control during calls from and [/] to radio subscribers, comprising: [which has] communication terminals:

a [- at least one] radio subsystem [(RSS, RSS*)] via which said communications terminals [(MS)] which allow access by the radio subscribers can be connected in an associated radio area; [(RRA, RRA*), and]

a [- at least one] switching center [(MSC)] for switching through connections;
[characterized by]

5 a radio transmission unit [(UE)] which is arranged between said [the] radio subsystem [(RSS)] and said [the] switching center [(MSC)] and via which said [the] connections are routed, said routing being implemented so that when [in such a way, - that, in the case of] a call within a radio area between radio subscribers within a [the] same radio area [(RRA)], or when [in the case of] a call between radio subscribers in different radio areas [(RRA, RRA*)] are made, only
10 signaling connections [(si)] are switched through from said [the] radio transmission unit [(UE)] to said [the] switching center [(MSC)], and said routing being implemented so [-] that traffic channel connections [(ni)] are switched by said [the] radio transmission unit [(UE)] between a first radio subsystem [(RSS)] and a second radio subsystem [(RSS*) in the case of] when a call is made within a
15 radio area from said first [the] radio subsystem [(RSS) itself] or when [in the case of] a call is made between radio subscribers in different radio areas [(RRA, RRA*)].

11. (Amended) The radio communications system as claimed in claim 10, wherein [having] said [a] radio transmission unit [(UE) which] is [in the form of] a satellite [(SAT)].
20

12. (Amended) The radio communications system as claimed in claim 10 [or 11, having], further comprising an interworking unit [(IWU, IWU*)] for controlling said [the] switching of said [the] signaling connections [(si)] and of said [the] traffic channel connections [(ni)] in a [the] respective said radio
25 subsystem [(RSS, RSS*)].

13. (Amended) The radio communications system as claimed in claim 12, further comprising [having an interworking unit (IWU, IWU*) which is connected

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to] a transcoder and data rate adaptation unit [(TRAU, TRAU*)], which is connected to said interworking unit.

14. (Amended) The radio communications system as claimed in claim 10, further comprising [one of claims 10 to 13, having] an interworking unit [(IWU)]
5 for controlling [the] switching of said [the] connections in said [the] switching center [(MSC)].

IN THE ABSTRACT


Delete original page 17 and replace the Abstract with Replacement Page 17 which has been provided on a separate sheet attached to the amendment. No
10 new matter has been added.

REMARKS

The present Amendment revises the specification and claims to conform to United States patent practice, before examination of the present PCT application in the United States National Examination Phase. Additionally, the
15 Applicants include herewith a copy of the new Abstract on a separate page. All of the changes are editorial and applicant believes no new matter is added thereby. The amendment of claims 1-14 is not intended to be a surrender of any of the subject matter of those claims.

Early examination on the merits is respectfully requested.

20 Submitted by,

 (Reg. No. 45,877)
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Attorney for Applicant(s)

430 Rec'd PCT/PTO 22 SEP 2000

BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

5 APPLICANT(S): KOEN MUYSEWINKEL, ET AL.
ATTORNEY DOCKET NO.: P00,1177
INTERNATIONAL APPLICATION NO: PCT/DE99/00734
INTERNATIONAL FILING DATE: 16 MARCH 1999
INVENTION: "METHOD AND RADIO COMMUNICATIONS SYSTEM
FOR CONTROLLING CONNECTIONS FOR CALLS TO
AND BY RADIO SUBSCRIBERS"


10 Assistant Commissioner for Patents,
Washington D.C. 20231

REQUEST FOR APPROVAL OF DRAWING MODIFICATIONS

Sir:

15 Enclosed are copies of the drawings (Figures 1-3) showing in red,
the addition of labels to each of the Figures. Applicant believes that no new
matter has been added. Approval of the additions is respectfully requested.

Submitted by,

 (Reg. No. 45,877)

20 Mark Bergner
SCHIFF HARDIN & WAITE
PATENT DEPARTMENT
6600 Sears Tower
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(312) 258-5779
25 Attorney for Applicant(s)

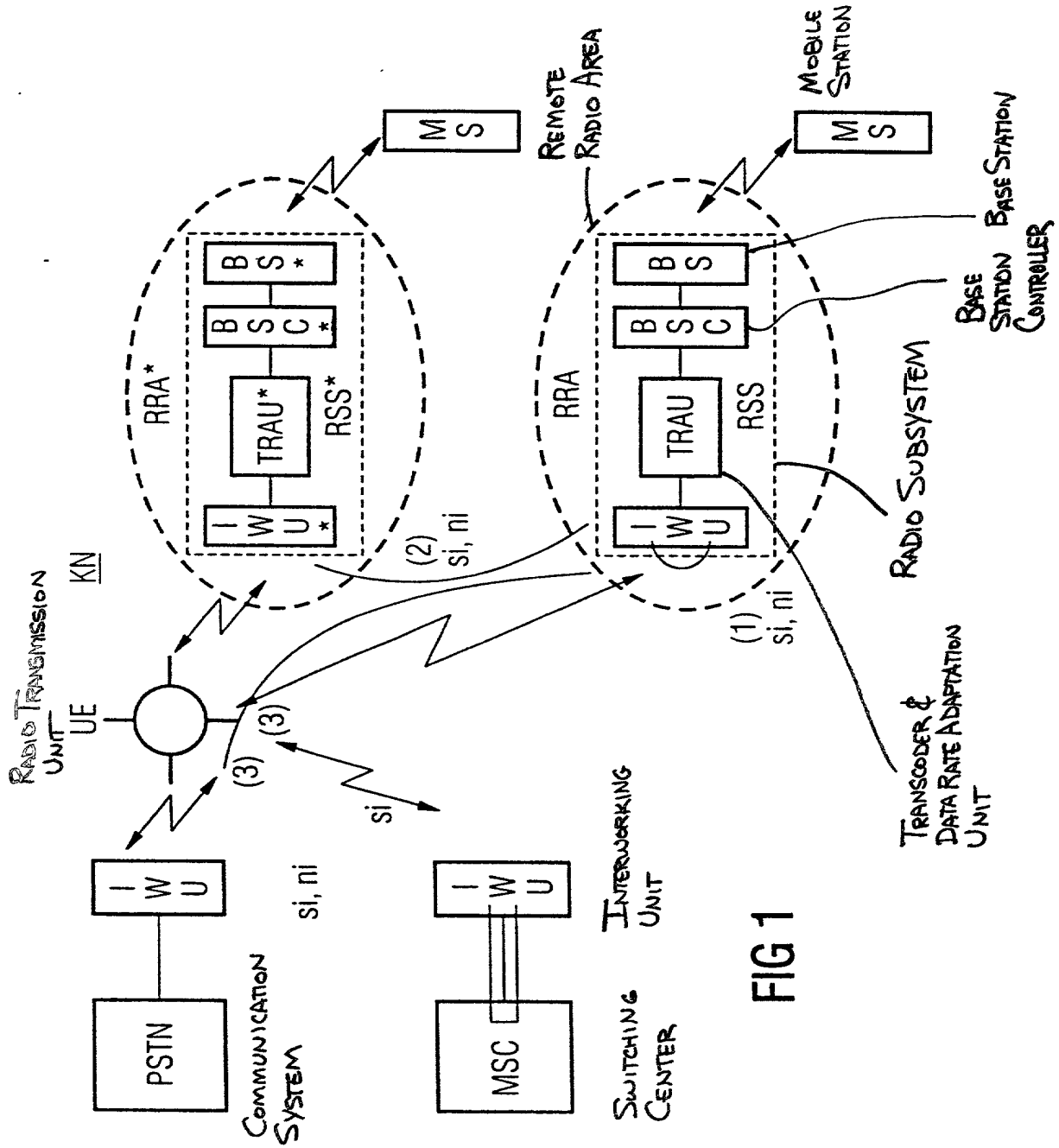
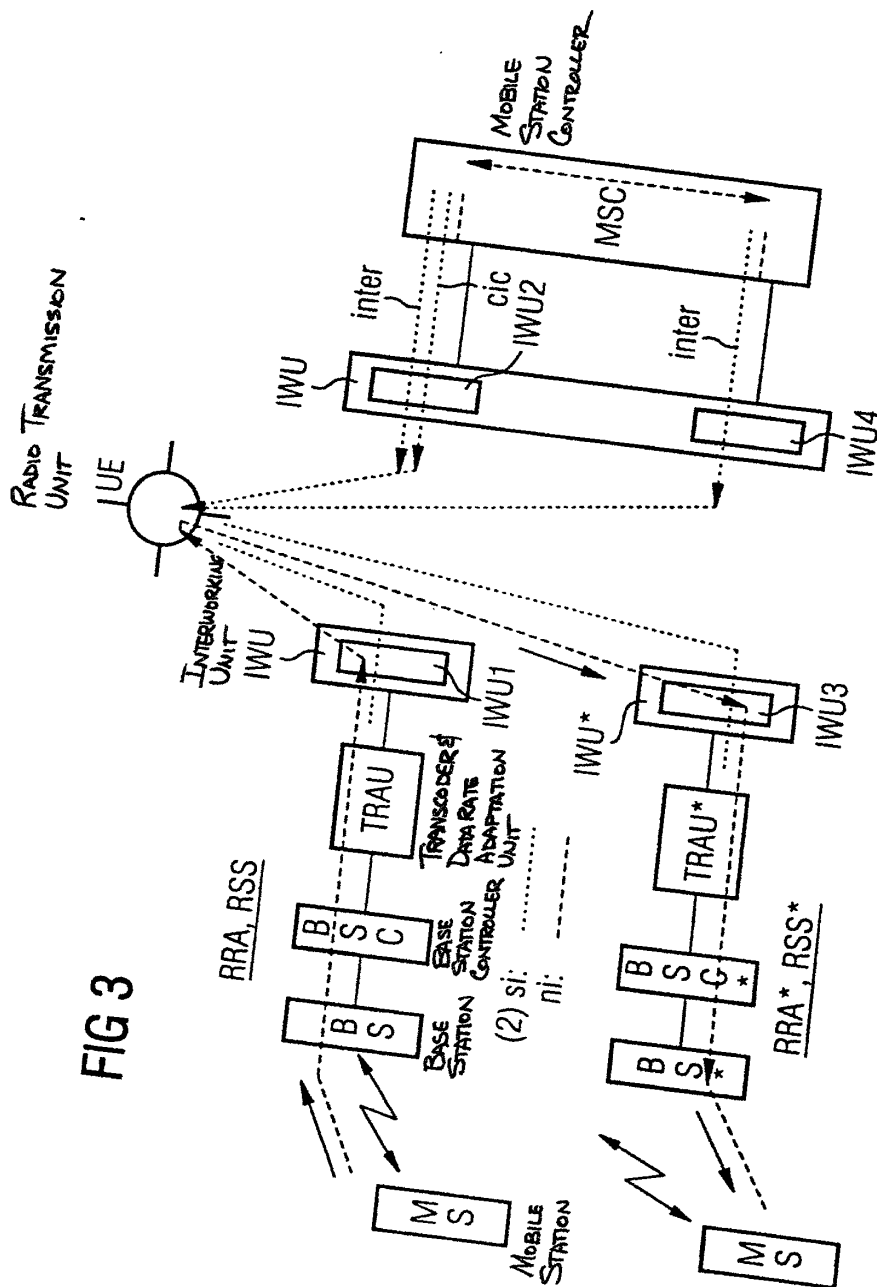


FIG 1

FIG 3



Description

5

10 . Radio communications systems are used to supplement or expand existing public or private communications systems. For example, in contrast to public communications systems such as the public telephone network, radio communications systems can at
15 least partially use wire-free communications connections. As is known, such radio communications systems have radio devices which can be combined to form at least one radio subsystem, for linking, without any wires, communications terminals which each allow
20 access by radio subscribers and switching devices for switching through connections - signaling connections and traffic channel connections. A radio subsystem can normally be assigned an associated radio area for supervising the radio subscribers moving with their
25 communications terminals in that area. This means that switching centers, radio devices and communications terminals which are networked to one another in a radio communications system can be connected to one another in a very large number of ways.

30 Each connection on the basis of an outgoing or
incoming call, in which at least one radio subscriber
is involved, must normally be routed via the switching
center. For certain areas, particularly remote areas -
for example islands, mountain valleys, deserts, etc. -
35 which are controlled by a radio subsystem with
appropriate radio devices, it may not be economically
worthwhile to use

[illegible]

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PCT/DE99/00734

- 2 -

and operate a dedicated switching center for each area. The use of the existing telecommunications resources should be optimized for this situation. Furthermore, a significant number of countries have no infrastructure to produce the link between the radio devices and one or more central switching centers in a radio communications system in order to use telecommunications services at a reasonable cost.

WO 95/24789 discloses a method for connection control in a radio communications system, which has transcoder units, at a distance from the base stations, for coding and decoding voice signals. In the case of a call between radio subscribers within a radio area or in the case of a call between radio subscribers in different radio areas, only signaling connections are switched through to the switching center. The traffic channel connections are switched by the radio subsystem itself for the first-mentioned case, and are switched between different radio subsystems for the second-mentioned case.

US 5,081,703 discloses a satellite communications system for rural areas, in which signals received from the satellites are converted by conversion units into signals for a switching center, and vice versa. In this case, the conversion units communicate with mobile stations which are located in predetermined geographical areas.

One object of the present invention is thus to specify a method and a radio communications system which improves the connection control during calls from/to radio subscribers.

According to the invention, this object is achieved by the features of patent claim 1 with regard to the method, and by the features of patent claim 10 with regard to the radio communications system. Developments of the invention can be found in the dependent claims.

Based on a radio communications system having at least one radio subsystem for access by the radio

AMENDED SHEET

subscribers in an associated radio area and having at least one switching center for switching through connections, the method and the radio communications system according to the invention provide for the connections between the radio subsystem and the switching center to be routed via a radio transmission unit in such a way,

- that, in the case of a call within a radio area between radio subscribers within the same radio area, or in the case of a call between radio subscribers in different radio areas, only signaling connections are switched through from the radio transmission unit to the switching center, and

- that traffic channel connections are switched by the radio transmission unit between a first radio

subsystem and a second radio subsystem in the case of a call within a radio area from the radio subsystem itself or in the case of a call between radio subscribers in different radio areas.

5 Since only the signaling connections are switched via the radio transmission unit - preferably in the form of a satellite - to the switching center, while the traffic channel connections are switched either locally in the radio subsystem or in the radio
10 transmission unit, the connection control can be optimized with a dynamic switching capacity - particularly for a remote radio area without its own switching center. It is thus sufficient to equip each such radio area only with radio devices rather than
15 with an oversize switching center, and to provide the through-switching functions of a switching center for traffic channel connections which are to be used as optimally as possible, in the radio subsystem or in the radio transmission unit according to the invention. A
20 further advantage of the subject matter of the invention over a solution in which the traffic channel connections are always switched through as far as the switching center is that, in the case of a call within a radio area, no traffic channel connections whatsoever
25 need be switched in the radio transmission unit, and in the case of a call between radio subscribers in different radio areas, fewer traffic channel connections need be switched in the radio transmission unit - since the switching center is bypassed for both
30 parts of the call connection. In both cases, this result in an increase in capacity with regard to the transmission bandwidth in the radio transmission unit, which is at its greatest when the traffic channel connections with the user information are switched
35 through in the case of a call within a radio area.

According to one advantageous development of the invention, even in the case of a call which relates to a radio subscriber and a subscriber of another communications system,

only the signaling connections are switched through from the radio transmission unit to the switching center, while the traffic channel connections between the radio communications system and the other communications system are switched by the radio transmission unit. This additionally results in an increase in capacity in the case of a call in which traffic channel connections from the other communications system, for example a cable-based public communications network (PLMN), would normally have to be switched to the switching center of the radio communications system but, according to the development, are actually passed on directly from the radio transmission unit to the radio subsystem.

According to another development of the invention, it has been found to be advantageous for control information to be sent back from the switching center via a switched-through signaling connection, on the basis of which control information the radio subsystem and/or the radio transmission unit cause/causes the traffic channel connections. It is thus possible in a simple way for the radio subsystem or the radio transmission unit to use the received control information to decide whether it should or should not switch through the user connections locally.

In this case, it is particularly advantageous if an identifier to identify trunks which are in each case used for the call in the switching center are also sent back from the switching center via a switched-through signaling connection, on the basis of which identifier the radio subsystem checks for the presence of a call within a radio area, and causes the switching of the traffic channel connections. The switching center uses this information to inform the radio subsystem in a simple way that the traffic channel connections can be switched through locally, since this is a call within the radio area.

Other developments of the invention provide for the switching of the signaling connections and of the traffic channel connections in the respective radio subsystem to be controlled by interworking units with a through-switching capability, and for the switching of the signaling connections to the switching center to be controlled by further interworking units with a through-switching capability.

It has also been found to be advantageous for the switching of the signaling connections and of the traffic channel connections for the uplink transmission direction from the communications terminal to the radio subsystem to be carried out after carrying out a transcoder and data rate adaptation function, and for that for the downlink transmission direction from the radio subsystem to the communications terminal to be carried out before carrying out the transcoder and data rate adaptation function in the respective radio subsystem.

The subject matter of the invention will be explained in more detail in the following text with reference to drawing illustrations, in which:

Figure 1 shows the block diagram of a radio communications system,

Figure 2 shows a schematic illustration of the connection control process according to the invention for a call within a radio area, and

Figure 3 shows a schematic illustration of the connection control process according to the invention for a call between radio subscribers in different radio areas.

Figure 1 shows the block diagram of a radio communications system KN, which normally has a number of radio subsystems to control the radio resources in radio areas in which there are radio subscribers. The chosen example shows

two radio subsystems RSS, RSS* for radio coverage of the associated radio areas RRA, RRA* (Remote Radio Area), via which communications terminals - mobile stations MS - which allow access to the radio subscribers can be connected via a radio interface. Devices in a radio communications system which is operated in accordance with the GSM method have been chosen as examples of the radio devices. However, the invention is not limited to GSM systems and can be used irrespective of the access technology for radio transmission, for example TDMA (Time Division Multiple Access), FDMA (Frequency Division Multiple Access), CDMA (Code Division Multiple Access) - and in other radio communications systems as well. Furthermore, the radio communications system KN has at least one switching center MSC for switching through connections, that is to say signaling connections and user channel connections, for calls from/to the radio subscribers. A gateway from the radio communications system KN to another communications system - in the present example to the public telephone network PLMN - is feasible, so that the connections for calls between a subscriber in the other communications system and a radio subscriber in the radio communications system KN can also be controlled according to the subject matter of the invention.

As is known, every radio subsystem RSS, RSS* has a base station BS, BS*, as the device of the opposite end to the mobile stations MS, for communication via the radio interface. A base station controller BSC, BSC* is connected to the base station BS, BS* in order to manage the radio resources - such as radio channel assignment. A transcoder and data rate adaptation unit TRAU, TRAU* is connected to the base station controller BSC, BSC* and is used to match the transmission rate - for example 16 kbit/s - used in the radio subsystem RSS, RSS* and on the radio interface, and the transmission rate - for example 64 kbit/s - processed in the switching center MSC to one another in

trunks used for the two connection elements in the switching center MSC, via a signaling connection si to the radio area RRA, on the basis of which the interworking unit IWU of the radio subsystem RSS
5 identity code the presence of the call within a radio area, and initiates internal switching of the traffic channel connections. The signaling connections si are always switched by the radio subsystem RSS via the satellite UE to the switching center MSC. The satellite
10 UE uses the information about the presence of the call within a radio area to identify that it need not provide any transmission channels for the user connections ni.

In the case of a call between radio subscribers
15 who are located in different radio areas RRA, RRA* - see case (2) - , connection control is carried out in such a way that the satellite UE once again switches through only the signaling connections si to the switching center MSC, and switches the traffic channel
20 connections ni between the radio subsystem RSS and the radio subsystem RSS*. The through-switching process for the traffic channel connections ni in the satellite UE is assisted by the interworking unit IWU, IWU* assigned to the respective radio subsystem RSS, RSS*. This means
25 that the satellite UE can directly link transmission channels for voice signal transmission which are associated with different radio subsystems RSS, RSS* or radio areas RRA, RRA*, without having to include the switching center MSC (bypassing). This leads to an
30 improvement in capacity with regard to the transmission bandwidth of the satellite UE. The signaling connections si for such calls are also always switched from the respective radio subsystem RSS, RSS* via the satellite UE to the switching center MSC.

35 A further example relating to the saving of bandwidth in the satellite UE is to bypass the switching center MSC for connection control for traffic channel connections ni which need to be switched when calls occur between the radio subscriber

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and the subscriber in the other communications system PSTN. Only the signaling connections si from the satellite UE to the switching center MSC are switched through in the same way as that described above while, in contrast, the traffic channel connections ni from the satellite UE are switched through directly between the radio subsystem - for example the radio subsystem RSS - of the radio communication system KN responsible for the radio subscriber, and the communications system PSTN responsible for the other subscriber. The communications system PSTN also has an interworking unit IWU with a through-switching capability to support direct switching of the traffic channel connections ni - see case (3) in Figure 1.

Figure 2 shows a schematic illustration of the connection control process according to the invention with the devices involved in this process for a call within a radio area, as shown in case (1) in Figure 1. In this case, the routing of the traffic channel connections ni is shown as a dashed-dotted line, and the routing of the signaling connections si is shown as a dotted line. The call in the radio area RRA is initiated from the mobile station MS of a first radio subscriber, and its destination is a second radio subscriber. The radio subsystem RSS handles the call in accordance with the known GSM procedures. The switching center MSC, which is coupled via the satellite UE to the radio subsystem RSS, likewise uses the known GSM procedures to identify the fact that the called radio subscriber is located in the same radio area RRA. It thus generates the control information intra, using which the presence of the call within the radio area can be checked. Furthermore, the switching center MSC produces an identity code cic (circuit identity code) which identity code the trunks used in the switching center MSC for the radio subscribers involved with the call. Both signaling information items cic, intra are sent from an interworking unit IWU2, which is arranged in the interworking unit IWU in the switching center

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interworking unit IWU1 in the interworking unit IWU of the relevant radio subsystem RSS on a signaling connection si.

5 The interworking unit IWU or the interworking unit IWU1 in the radio subsystem RSS evaluates the received information cic, intra to identify the fact that local through-switching of the traffic channel connections ni is possible, and initiates the through-switching function triggered via the received signaling information. The traffic channel connections ni are 10 thus routed via the interworking unit IWU1 of the interworking unit IWU directly to the radio devices in the radio subsystem - TRAU, BSC and BS - back and from there to the mobile station MS of the called radio subscriber - see the arrows printed in bold. 15

Figure 3 shows a schematic illustration of the connection control process according to the invention with the devices involved in this process for a call between radio subscribers in different radio areas RRA, RRA* as shown in case (2) in Figure 1. In this case, 20 the routing of the traffic channel connections ni - analogously to the illustration in Figure 2 - is shown as a dashed-dotted line, and the routing of the signaling connections si is shown as a dotted line. The call in the radio area RRA is initiated from the mobile station MS of a first radio subscriber, and its destination is a second radio subscriber. The radio subsystem RSS handles the call in accordance with the known GSM procedures. The switching center MSC, which 25 is coupled to the radio subsystem RSS via the satellite UE, likewise uses the known GSM procedures to identify the fact that the called radio subscriber is located in another radio area RRA*. It thus generates a control information item inter which indicates that the call is taking place between radio subscribers in different radio areas RRA, RRA*. It also receives the identity code cic (circuit identity code) for the trunks used in the switching center MSC. The signaling information is 35 sent from the interworking unit IWU2

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via the satellite UE on a signaling connection si and thus [lacuna] the switching of the traffic channel connections ni in the interworking unit IWU1 - bypassing the switching center MSC - to the radio subsystem RSS*. In this subsystem, the interworking unit IWU* has an interworking unit IWU3 which is intended to switch the traffic channel connections ni through for the call. The routing of the traffic channel connections ni from the interworking unit IWU1 to the satellite UE is thus followed by direct connection of the satellite UE to the interworking unit IWU3. The connection is controlled by the interworking unit IWU2. In the radio subsystem RSS*, the interworking unit IWU3 switches the traffic channel connections ni through, so that the user information - primarily voice signals - is passed to the radio devices - TRAU*, BSC* and BS* - and from there to the mobile station MS of the called radio subscriber - see the arrows printed in bold.

In addition to the interworking unit IWU2, the switching center MSC has a further interworking unit IWU4, from which signaling information - such as the control information inter - relating to the radio subscriber located in the radio area RRA* and to the trunks used for the second connection element can be sent back via the satellite UE. The through-switching process for connection control according to the invention, which switches the traffic channel connections locally in the radio subsystem or directly in the satellite, requires only half the normal bandwidth when each connection element is passed via the switching center MSC.

A procedure analogous to that in Figure 2 can also be used in case (3) shown in Figure 1, by the through-switching functions acting directly via the satellite UE on the traffic channel connections between the communications system PSTN and the radio subsystem RSS of the radio communications system KN. This depends on the switching center MSC being linked to the communications system PSTN via a radio transmission device UE, preferably a satellite. In this

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New Patent Claims

Patent Claims

1. A method for connection control in a radio
5 communications system (KN) during calls from/to radio
subscribers, having
- at least one radio subsystem (RSS, RSS*) via
which communications terminals (MS) which allow access
by the radio subscribers can be connected in an
10 associated radio area (RRA, RRA*),
 - at least one switching center (MSC) for
switching through connections,
characterized
 - in that the connections between the radio subsystem
15 (RSS) and the switching center (MSC) are routed via a
radio transmission unit (UE) in such a way,
 - that, in the case of a call within a radio
area between radio subscribers within the same radio
area (RRA), or in the case of a call between radio
20 subscribers in different radio areas (RRA, RRA*), only
signaling connections (si) are switched through from
the radio transmission unit (UE) to the switching
center (MSC), and
 - that traffic channel connections (ni) are
25 switched by the radio transmission unit (UE) between a
first radio subsystem (RSS) and a second radio
subsystem (RSS*) in the case of a call within a radio
area from the radio subsystem (RSS) itself or in the
case of a call between radio subscribers in different
30 radio areas (RRA, RRA*).
2. The method as claimed in claim 1, in which
in the case of a call which relates to a radio
subscriber and a subscriber of another communications
system (PSTN), only the signaling connections (si) are
35 switched through from the radio transmission unit (UE)
to the switching center (MSC), and the traffic channel
connections (ni) between the radio communications
system (KN) and the other communications system (PSTN)
are switched by the radio transmission unit (UE).

3. The method as claimed in claim 1 or 2, in which control information (intra, inter) is sent back from the switching center (MSC) via a switched-through signaling connection (si), on the basis of which control information (intra, inter) the radio subsystem (RSS) and/or the radio transmission unit (UE) cause/causes the switching of the traffic channel connections (ni).
4. The method as claimed in claim 3, in which an identifier (cic) to identify trunks which are in each case used for the call in the switching center (MSC) are also sent back from the switching center (MSC) via a switched-through signaling connection (si), on the basis of which identifier (cic) the radio subsystem (RSS) checks for the presence of a call within a radio area, and causes the switching of the traffic channel connections (ni).
5. The method as claimed in one of the preceding claims, in which voice signals are transmitted on the traffic channel connections (ni).
6. The method as claimed in one of the preceding claims, in which a satellite (SAT) is used as the radio transmission unit (UE).
7. The method as claimed in one of the preceding claims, in which the switching of the signaling connections (si) and of the traffic channel connections (ni) for the uplink transmission direction from the communications terminal (MS) to the radio subsystem (RSS) takes place after carrying out a transcoder and data rate adaptation function, and that for the downlink transmission direction from the radio subsystem (RSS) to the communications terminal (MS) takes place before carrying out the transcoder and data rate adaptation function in the respective radio subsystem (RSS).
8. The method as claimed in one of the preceding claims, in which

RSS*) is controlled by an interworking unit (IWU, IWU*) with a through-switching capability.

9. The method as claimed in one of the preceding claims, in which

5 the switching of the signaling connections (si) to the switching center (MSC) is controlled by an interworking unit (IWU) with a through-switching capability.

10. A radio communications system (KN) for connection control during calls from/to radio subscribers, which has

- at least one radio subsystem (RSS, RSS*) via which communications terminals (MS) which allow access by the radio subscribers can be connected in an associated radio area (RRA, RRA*), and

15 - at least one switching center (MSC) for switching through connections characterized by

a radio transmission unit (UE) which is arranged between the radio subsystem (RSS) and the switching center (MSC) and via which the connections are routed in such a way,

20 - that, in the case of a call within a radio area between radio subscribers within the same radio area (RRA), or in the case of a call between radio subscribers in different radio areas (RRA, RRA*), only signaling connections (si) are switched through from the radio transmission unit (UE) to the switching center (MSC), and

25 - that traffic channel connections (ni) are switched by the radio transmission unit (UE) between a first radio subsystem (RSS) and a second radio subsystem (RSS*) in the case of a call within a radio area from the radio subsystem (RSS) itself or in the case of a call between radio subscribers in different radio areas (RRA, RRA*).
35

11. The radio communications system as claimed in claim 10, having a radio transmission unit (UE) which is in the form of a satellite (SAT).

12. The radio communications system as claimed in claim 10 or 11, having

an interworking unit (IWU, IWU*) for controlling the switching of the signaling connections (si) and of the
5 traffic channel connections (ni) in the respective radio subsystem (RSS, RSS*).

13. The radio communications system as claimed in claim 12, having

an interworking unit (IWU, IWU*) which is connected to
10 a transcoder and data rate adaptation unit (TRAU, TRAU*).

14. The radio communications system as claimed in one of claims 10 to 13, having

an interworking unit (IWU) for controlling the
15 switching of the connections in the switching center (MSC).

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Abstract

Method and radio communications system for connection control during calls from/to radio subscribers

Based on a radio communications system (KN) having at least one radio subsystem (RSS) for access by the radio subscribers in an associated radio area (RRA) and having at least one switching center (MSC) for switching through connections, the method and the radio communications system according to the invention provide for the connections between the radio subsystem and the switching center to be routed via a radio transmission unit (UE) in such a way,

- that, in the case of a call within a radio area between radio subscribers within the same radio area (RRA), or in the case of a call between radio subscribers in different radio areas (RRA, RRA*), only signaling connections (si) are switched through from the radio transmission unit to the switching center, and

- that traffic channel connections (ni) are switched by the radio transmission unit between a first radio subsystem (RSS) and a second radio subsystem (RSS*) in the case of a call within a radio area from the radio subsystem (RSS) itself or in the case of a call between radio subscribers in different radio areas (RRA, RRA*).

FIGURE 1

ABSTRACT

Based on a radio communications system (KN) having at least one radio subsystem (RSS) for access by the radio subscribers in an associated radio area (RRA) and having at least one switching center (MSC) for switching through connections, the method and the radio communications system according to the invention provide for the connections between the radio subsystem and the switching center to be routed via a radio transmission unit (UE) in such a way, that, in the case of a call within a radio area between radio subscribers within the same radio area (RRA), or in the case of a call between radio subscribers in different radio areas (RRA, RRA*), only signaling connections (si) are switched through from the radio transmission unit to the switching center, and that traffic channel connections (ni) are switched by the radio transmission unit between a first radio subsystem (RSS) and a second radio subsystem (RSS*) in the case of a call within a radio area from the radio subsystem (RSS) itself or in the case of a call between radio subscribers in different radio areas (RRA, RRA*).

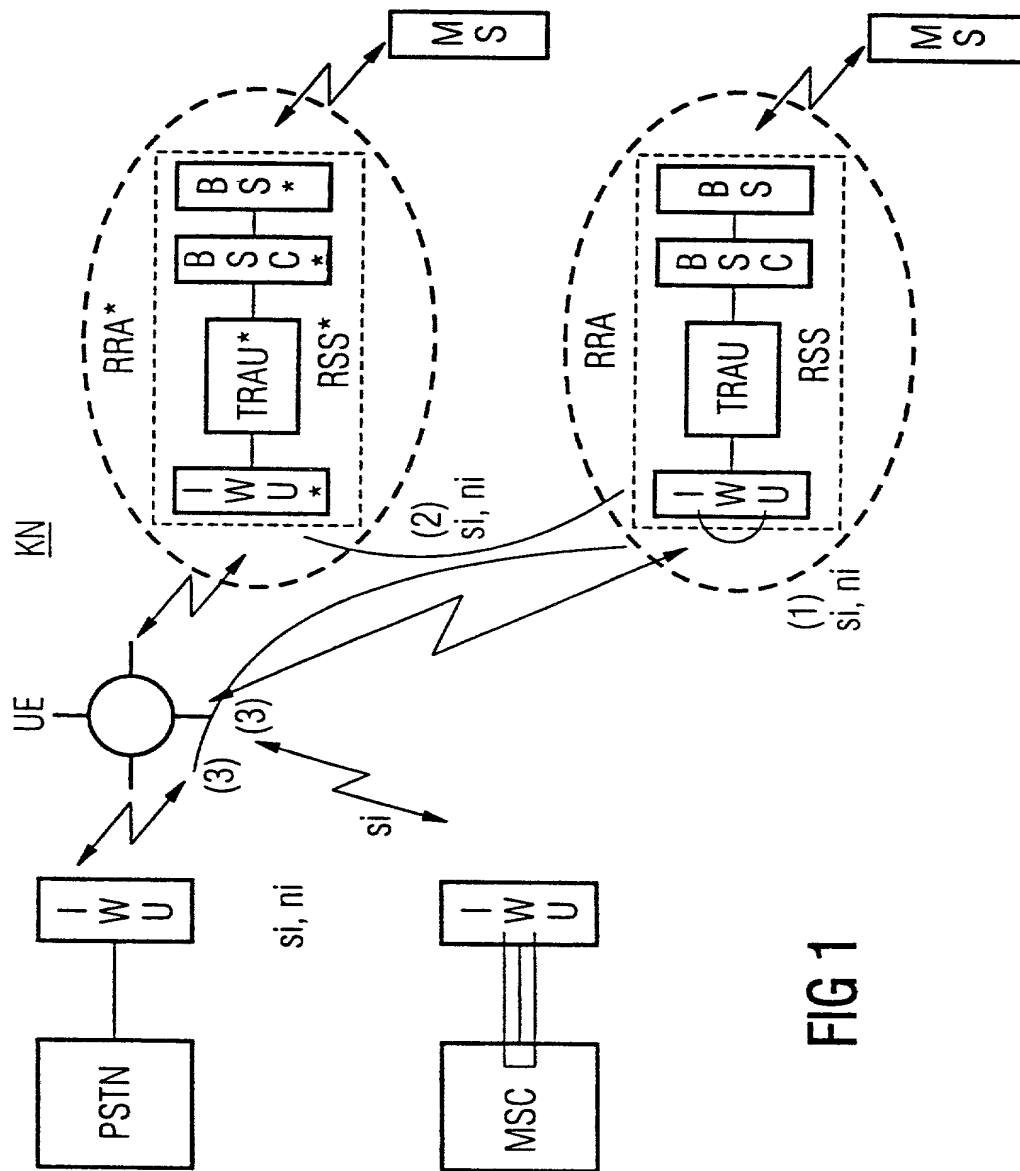


FIG 1

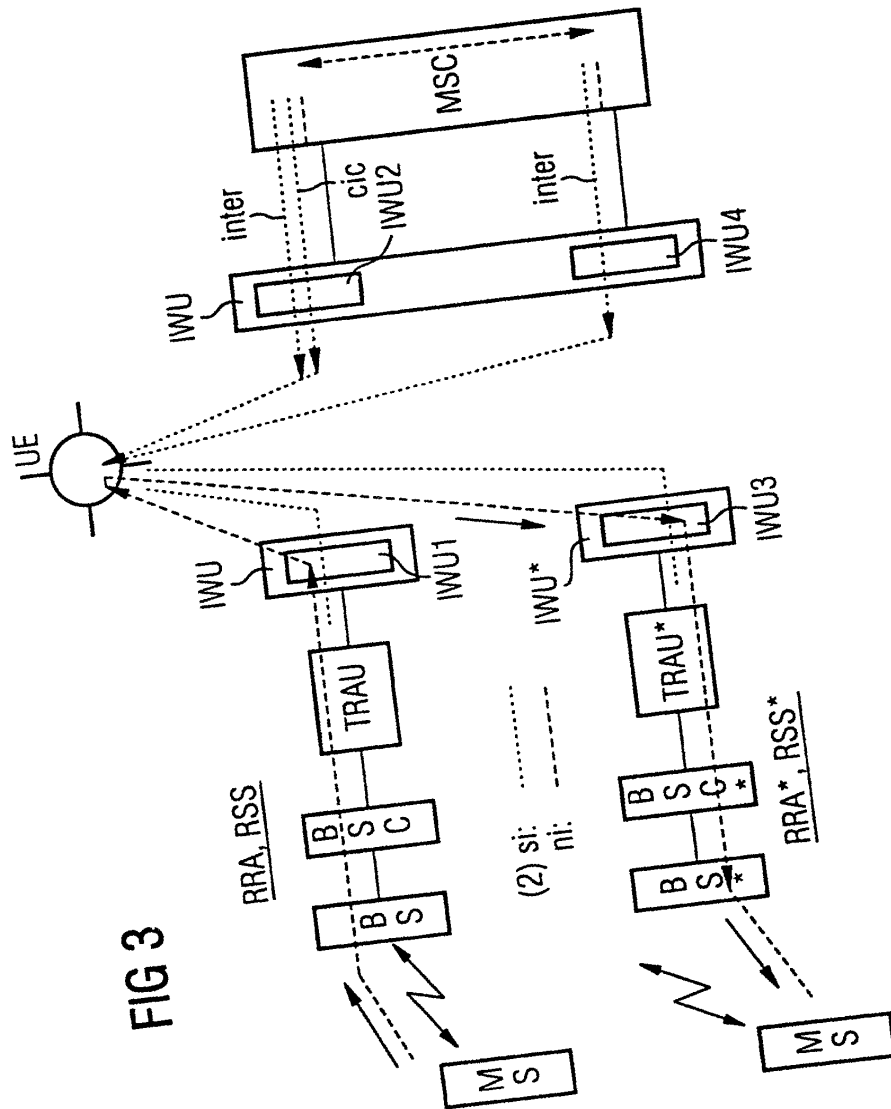


FIG 3

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S): Koen Muysewinkel, et al.
ATTORNEY DOCKET NO.: P00,1177
INTERNATIONAL APPLICATION NO: PCT/DE99/00734
INTERNATIONAL FILING DATE: 16 MARCH 1999
INVENTION: METHOD AND RADIO COMMUNICATIONS SYSTEM
FOR CONTROLLING CONNECTIONS FOR CALLS TO
AND BY RADIO SUBSCRIBERS

Assistant Commissioner for Patents,
Washington, D.C. 20231

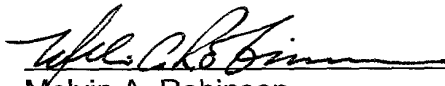
APPOINTMENT OF ASSOCIATE POWER OF ATTORNEY

Sir:

I am an attorney designated on the Power of Attorney for the above-referenced application. I hereby appoint Mark Bergner (Reg. No. 45,877) as an associate attorney, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

20

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German Language Declaration

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German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

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(Nummer) (Land) (Tag Monat Jahr eingereicht)

☒ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

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Yes No
Ja Nein

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(Nummer) (Land) (Tag Monat Jahr eingereicht)

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Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1 56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind

I hereby claim the benefit under Title 35 United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1 56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application

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(Filing Date)
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(Status)
(patentiert, anhängig,
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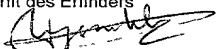
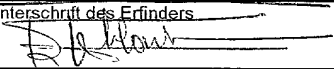
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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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